

## **Efficient production of methanol from biomass via black liquor gasification**

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Inspired by the commercialization of gasification in applications for integrated power and chemicals production in other industries, the pulp and paper industry is currently turning its attention to black liquor gasification as a possible means of improving the economic and environmental performance of the chemical pulp mill. Black liquor is a byproduct stream of kraft pulping and contains dissolved lignin and inorganic chemicals from the pulping operation. Today, black liquor is processed in chemical recovery boilers to regenerate the chemicals and recover the energy as steam and power. Pressurized gasification of the black liquor can improve the energy efficiency, while generating conventional or modified cooking liquors and a syngas. Current concepts being developed aim to use the syngas in a gas turbine as part of an integrated black liquor gasification combined cycle.

Meanwhile, there is a growing interest in finding ways to produce CO<sub>2</sub>-neutral automotive fuels, by using biomass as the raw material. Such concepts are based on pressurised gasification of woody biomass with oxygen and reach a biomass to methanol conversion of 50- 55% based on state of the art technology. It turns out to be practically difficult to reach higher conversion from raw biomass.

Worldwide, the pulp and paper industry currently processes about 170 million tonnes of black liquor (measured as dry solids) per year, with a total energy content of about 2 EJ, making black liquor a very significant biomass fuel. In comparison with other potential biomass sources for chemicals production, black liquor has the great advantage that it is already partially processed and in a pumpable, liquid form. Using black liquor as a raw material for methanol production would have the following advantages:

- ?? the process is easily pressurized
- ?? the syngas has a low methane content
- ?? gasification capital cost is shared between recovery of inorganic chemicals, steam production and syngas production.

### **Basis for calculations**

System performance was calculated for a mill used as a reference in the “ecocyclic pulp mill” program, a large ongoing research effort in the Swedish pulp and paper industry. The process equipment, mode of operation and material and energy balances have been well defined for the reference mill, which is assumed to employ late 1990s state-of-the-art technology in all process departments. Although the actual reference mill has not been built, its characteristics well match those of mills that have been built or rebuilt in the last few years. The mill produces bleached market pulp from softwood.

## Results

